

## Intermediate level DDL and Simple DML statements

### Lab Objective

Familiarize students with intermediate level DDL commands and simple DML statements in SQL.

### Lab Outcome

After completing this lab successfully, students will be able to:

1. **Understand and execute** DDL commands to define integrity constraints and modify the database schema.
2. **Construct** DML statements to perform queries involving distinct keyword, generalized projection, simple multi-table queries and so on.

### Psychomotor Learning Levels

This lab involves activities that encompass the following learning levels in psychomotor domain.

Level	Category	Meaning	Keywords
P1	Imitation	Copy action of another; observe and replicate.	Relate, Repeat, Choose, Copy, Follow, Show, Identify, Isolate.
P2	Manipulation	Reproduce activity from instruction or memory	Copy, response, trace, Show, Start, Perform, Execute, Recreate.

### Lab Activities

#### 1. Schema Definition along with Integrity Constraints

```
CREATE TABLE <table_name>
(
    <attribute_name1> <datatype> [NOT NULL],
    <attribute_name2> <datatype> [NOT NULL],
    ...,
    [constraint <constraint_name>] primary key (<attribute_name,...>),
    [constraint <constraint_name>] foreign key (<attribute_name,...>)
    references <parent_table_name>(<attribute>) [ON DELETE CASCADE]],
    [constraint <constraint_name>] check (<condition>)
);
```

Task:

- Create department relation with dept\_name, building and budget attributes where dept\_name must be the primary key and budget must be positive.
- Create another relation course with course\_id, title, dept\_name and credits where course\_id is the primary key, dept\_name is the foreign key and credits must be greater than or equal to 1.

#### 2. Schema Modification

Adding a new attribute:

```
ALTER TABLE <table_name> ADD <attribute_name> <datatype>;
```

Dropping an attribute:

```
ALTER TABLE <table_name> DROP column <attribute_name>;
```

Modifying data type of an attribute (Column must be empty/has no values):

```
ALTER TABLE <table_name> MODIFY <attribute_name> <new_type>;
```

Renaming an attribute:

```
ALTER TABLE <table_name> RENAME column <attribute_name> to  
<new_attribute_name>;
```

Renaming a table:

```
ALTER TABLE <table_name> RENAME TO <new_table_name>;
```

Adding a constraint into a table (primary key constraint, foreign key constraint):

```
ALTER TABLE <table_name> ADD CONSTRAINT <constraint_name>  
<constraint>;
```

Deleting a constraint from a table:

```
ALTER TABLE <table_name> DROP CONSTRAINT <constraint_name>;
```

Checking all constraints:

```
SELECT * FROM user_cons_columns WHERE TABLE_NAME =  
<table_name>;
```

Dropping a Table (both data and schema):

```
DROP TABLE <table_name>;
```

### 3. Manipulating Data (DML)

*Basic Query Structure*

```
SELECT A1, A2, ..., An [list of attributes]  
FROM r1, r2, ..., rm [list of relations]  
WHERE P [condition]
```

Inserting records into a table:

```
INSERT INTO <table_name> VALUES (... , ... , ...);
```

Deleting records from a table:

```
DELETE FROM <table_name> WHERE <condition>;
```

Updating values of a record in a table:

```
UPDATE <table_name>  
SET <attribute_name> = <value>  
WHERE <condition>;
```

*Multi-table queries*

Cartesian product:

```
select *  
from instructor, department;
```

*This generates many tuples which are not meaningful. To get the meaningful tuples, you need to write:*

```
select *  
from instructor, department;  
where instructor.dept_name = department.dept_name;
```

Natural join:

```
select * from instructor natural join department;
```

**You must write all SQL statements in notepad first and save them with .sql extension.  
 Then execute your SQL scripts.**

**Lab Task # 01 (Schema Definition):**

Write SQL statements to create the following tables with the given constraints.

i) account

account_no	char(5)	primary key
balance	number	Not null and cannot be less than 0

ii) customer

customer_no	char(5)	primary key
customer_name	varchar2(20)	Not null
customer_city	varchar2(10)	

iii) depositor

account_no	char(5)	
customer_no	char(5)	
		primary key (account_no, customer_no)

**Lab Task # 02 (Schema Modification):**

After executing each of these SQL statements execute the command – **desc <table\_name>** to confirm the changes.

- i. Write SQL statement to add a new attribute 'date\_of\_birth' (date type) in customer table.
- ii. Write SQL statement to drop the attribute 'date\_of\_birth' from customer table.
- iii. Write SQL statement to rename the attribute account\_no, customer\_no from depositor table to a\_no and c\_no, respectively.
- iv. Write SQL statements to add two foreign key constraints 'depositor\_fk1' and 'depositor\_fk2' which identifies a\_no and c\_no as a foreign key.

**Lab Task # 03 (Inserting Records into Tables):**

Write appropriate SQL statements to insert the records as shown below.

Account		Customer			Depositor	
ACCOUNT_NO	BALANCE	CUSTOMER_NO	CUSTOMER_NAME	CUSTOMER_CITY	A_NO	C_NO
A-101	12000	C-101	Alice	Dhaka	A-101	C-101
A-102	6000	C-102	Annie	Dhaka	A-103	C-102
A-103	2500	C-103	Bob	Chittagong	A-103	C-104
		C-104	Charlie	Khulna	A-102	C-103

### **Lab Task # 04 (Queries):**

- i. Display customer name and customer city only.
- ii. Display the unique customer city. No repetitions are allowed.
- iii. Find account numbers with balance more than 7000.
- iv. Find customer number and customer name who live in Khulna.
- v. Find customer number and customer name who do not live in Dhaka.
- vi. Find customer name and customer city who have accounts with balance more than 7000.
- vii. Find customer name and customer city who have accounts with balance more than 7000 and do not live in Khulna.
- viii. Find account number and balance for those accounts which belong to a customer with id 'C-102'.
- ix. Find all account number and balance for those accounts which belong to customers of Dhaka and Khulna city.
- x. Find the customer who have no accounts. [Result of this query will be empty for this dataset. However, you must write the correct SQL]

### **Submission**

Take screenshots of the execution and result of your queries in SQLPlus Tool and insert the captured image in a doc file for each and every question . Submit both doc and sql file in the given submission link in the Classroom. Submit files separately. Name the file as per the following format: 2022-1-60-001\_LAB02.docx and 2022-1-60-001.sql\_LAB02.